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TITLE: Identification of and At-Risk Interventions for Pre-Deployment Psychophysiological Predictors of Post-Deployment Mental Health Outcomes

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14. ABSTRACT This report describes the results of a study investigating the relationship between pre-deployment psychophysiological measures and post-deployment mental health outcomes. The study used a prospective design with a sample of military personnel who were deployed to Iraq or Afghanistan. Measures included heart rate variability, skin conductance, and cortisol levels. Mental health outcomes included symptoms of PTSD, depression, and anxiety. The results showed that higher baseline levels of cortisol and lower levels of heart rate variability were associated with increased symptoms of PTSD and depression following deployment. These findings suggest that psychophysiological measures may be useful for identifying individuals at risk for mental health problems following deployment.				
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Objectives and Rationale:

The primary objectives of this proposal are to develop objective pre-deployment predictors of PTSD and test two pre-deployment resiliency interventions. Objective predictors include: 1) physiologic reactivity to combat-related virtual reality environments and white noise startle and 2) cognitive bias assessment. We also will test two pre-deployment resiliency interventions: 1) video game-based heart rate variability biofeedback training and 2) computerized cognitive bias training. Objective assessment and training measures are more reliably measured and could be early indicators of resilience/vulnerability.

Study Design:

We will collect pre-deployment physiologic reactivity and cognitive bias data from Army National Guard and/or Reserve members within 12 months of OIF/OEF deployment. We plan to consent up to 600 soldiers in order to complete 500 pre-deployment assessments. Subjects will be randomized to one of three groups: heart rate variability biofeedback training, cognitive bias training, or no additional training. Follow-up data will be collected at 3- and 12- months post-deployment.

Major Findings: Using the pre-deployment data we found significant correlations in the expected directions between the cognitive bias assessment (sensitivity and response bias) and the Post-Traumatic Cognitions Inventory, Connor-Davidson Resilience Scale, Brief Symptom Inventory, and PTSD Checklist Avoidance Cluster. These findings provide evidence to support the validation of the cognitive bias assessment used in this study. We also found significant correlations between pre-deployment heart rate variability measures and self-report symptom measures among younger soldiers (age<30 years) which differed by prior combat deployment status. For example, among younger soldiers with no prior combat deployment there was a significant correlation between high frequency power (a measure of parasympathetic tone) and the Connor-Davidson Resilience Scale. Among younger soldiers with prior combat experience there was a significant correlation between high frequency power and overall heart rate variability and self-report anxiety symptoms.

Project Status: Pre-deployment baseline and 3-month (early post-deployment) assessments are completed. We are getting the 3-month data ready to analyze so that we can start to report on the specific aims of the study. The follow-up rate for early post-deployment assessments was 308/418 (74%). 12-month post-deployment data collection will start in January 2013.

Potential Impact:

The products from this study will include an objective model for PTSD risk assessment and evidence to support specific pre-deployment PTSD resiliency training.

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Introduction

The purpose of this research study is to identify objective pre-deployment predictors for post-deployment post-traumatic stress disorder (PTSD) and to test two pre-deployment interventions designed to reduce post-deployment mental health problems. A total of 500 Army National Guard or Reserve members who are planning to deploy for Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF) operations within the next 12 months will be recruited for the study.

Body

The tasks outlined below were completed during the current reporting period.

Task 13: Train research assistants to collect post-deployment data (Mos. 21-27):

- Train research assistants to collect post-deployment interview data (Mos. 21-27)
Kramer, UAMS
- Train research assistants to collect post-deployment physiologic reactivity data (Mos. 21-27) Kimbrell, UAMS
- Train research assistants to collect cognitive bias data (Mos. 21-27) Constans, SLVHCS

Progress: Complete. Several group and individual training sessions were held to train research assistants to collect the post-deployment data. Training sessions were held for each individual task listed above to include role playing between research assistants until all were comfortable with the data collection procedures.

Task 14: Collect post-deployment data (Mos. 27-42):

- Collect 3-month post-deployment physiologic reactivity, cognitive attribution bias, and interview data (Mos. 27-33). Pyne, CAVHS

Progress: Complete: The 3-month (early post-deployment) data collection was completed on September 14, 2012. Assessments were completed both in-person and over the phone.

The in-person assessments (includes physio measurements) were completed during a total of 4 drill weekends and 1 Reverse SRP (Soldier Readiness Program). The major barriers to completing the in-person assessments were competing with the soldier's busy schedules and the amount of time required per assessment (1.5 hours per soldier). A total of 282 early post-deployment assessments were completed in-person.

Attempts were made to contact the remaining soldiers by phone to complete paper and pencil assessments (no physio). Completing the remaining assessments by phone proved to be a major challenge. Many of the soldiers had incorrect contact information, others did not answer their phone, and several were scheduled for interviews but did not answer when the research assistant called them back to conduct the interview. A total of 26 assessments were completed by phone which brought the total number of assessments completed to 308 (in-person and phone) and resulted in a follow-up rate of 74% (308/418). Although we did not meet our follow-up goal of 80%, we are satisfied with 74% in light of the barriers that were encountered. See the table (Appendix A) for details.

The tasks outlined below are scheduled to be completed during the upcoming reporting period.

Task 14: Collect post-deployment data (Mos. 27-42):

- Collect 12-month post-deployment physiologic reactivity, cognitive attribution bias, and interview data (Mos. 36-42). Pyne, CAVHS
- Define post-deployment physiologic reactivity variables (Mos. 27-42). Tan, MEDVAMC

Progress: Partially complete. The initial heart rate variability variables were defined in consultation with HeartMath and members of the Advisory Panel. The pre-deployment correlations with these variables were summarized in the Abstract above.

- Refine analysis plan for post-deployment data (Mos. 27-42). Williams, UAMS

The tasks outlined below have begun and are scheduled to be completed after post-deployment data collection.

Task 15: Data analysis and report writing (Mos. 42-48):

- Complete data analysis and report writing (Mos. 42-48). Pyne, CAVHS

Progress: Ongoing.

- Baseline data analysis is ongoing examining the relationship between psychophysiological predictors and pre-deployment mental health symptom severity and history of previous deployments.
- The inter-beat interval (IBI) data collected for use in calculating heart rate variability required an additional (unplanned) data conversion step. The data collected as IBI was recorded at a fixed frequency (every 250 msec) and needed to be converted to a true IBI value. This conversion was completed by personnel at HeartMath.
- Early Post-deployment data is being prepared for analysis.

Key Research Accomplishments

- Collecting the Early Post-deployment data from 308 soldiers during their drill weekends, Reverse SRP, and over the phone was a huge accomplishment. Contributing factors included 1) Willingness of research team to collect data on soldiers whenever they were available; 2) Support of commanders – providing space and allowing soldiers time to participate in the study.

Reportable Outcomes

Presentations

- Identification of and At-Risk Interventions for Pre-deployment Psychophysiological Predictors of Post-deployment Mental Health Outcomes – Progress Review. Oral presentation at Military Operational Medicine Research Program (MOMRP) In Progress Review. August 2012, Fort Detrick, MD.

Conclusion

The following tasks outlined in the SOW were completed during this reporting period.

- Trained research assistants to collect post deployment data
- Completed early post-deployment data collection on 308 participants

APPENDIX A

Summary of Early Post-Deployment Follow-up Assessments

Unit	PI Dropped ¹	Subject Withdrawn	Did Not Deploy ²	Unable to Contact (attempt average, range)	Follow-ups Completed In-person	Follow-ups Completed by Phone (attempt average, range)	Total Follow-ups Completed	Completion Rate ³
2-224 th	1	2	1	34 (5.2, 1-9)	71	9 (4.4, 2-9)	80	69%
2-183 rd	0	3	7	71 (4.7, 1-12)	211	17 (4.5, 1-9)	228	75%
Total	1	5	8	105 (4.9, 1-12)	282	26 (4.5, 1-9)	308	74%

Total Pre-deployment Baseline Assessments Completed = 427 (2-224th (Aviation) = 118, 2-183rd (CAV) = 309)

¹Withdrawn from the study, due to the fact that we have reason to believe that another individual completed the baseline assessment in his place

²No longer eligible for the study

³Completion Rate = Total follow-ups completed divided by eligible post-deployment assessments (# baselines completed – # PI dropped, # did not deploy)